

# 13<sup>th</sup> WMO/IAEA Meeting of Experts on Carbon Dioxide Concentration and Related Tracers Measurement Techniques Boulder, Colorado 19-22 September 2005

## Monday, September 19

8:00-9:00	Registration
9:00-9:10	Organizers Announcements
9:10-9:20	Welcome to Boulder/CMDL (James Butler, Deputy Director, CMDL)
9:20-9:30	Dedication: C.D. Keeling (Pieter Tans)

## WMO/IAEA

9:30-9:50	<b>L. Barrie</b>	The WMO Global Atmosphere Watch (GAW) Programme In The Context Of Integrated Global Observations
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## Standards and Calibration (Chair: B. Hall)

9:50-10:10	<b>Y. Tohjima</b>	Preparation of gravimetric CO <sub>2</sub> standards by one -step dilution method
10:10-10:30	<b>--Break--</b>	
10:30-10:50	<b>P. Tans</b>	Revision of the international calibration scale for CO <sub>2</sub> -in-air: WMO-X2005
10:50-11:10	<b>L. Zhou</b>	Round robin update
11:10-11:30	<b>S. Ishidoya</b>	Preparation of a large amount of standard air for O <sub>2</sub> /N <sub>2</sub> measurements
11:30-11:50	<b>A. Jordan</b>	Calibration of Atmospheric Hydrogen Measurements
11:50-1:05	<b>--Lunch--</b>	

## Handling of Calibration Gases (Chair: B. Hall)

1:05-1:25	<b>P. Sturm</b>	Thermal fractionation effects associated with Ar/N <sub>2</sub> measurements
1:25-1:45	<b>R. Keeling</b>	O <sub>2</sub> /N <sub>2</sub> and Ar/N <sub>2</sub> measurements and fractionation issues
<b>1:45-2:30</b>	<b>Discussion Concerning Standards and Handling of Calibration Gases (P. Tans and R. Keeling)</b>	
2:30-2:50	<b>--Break--</b>	
<b>2:50-3:30</b>	<b>Recommendations concerning Standards and Handling of Calibration Gases</b>	
3:30-5:30	<b>Poster Session</b>	

## Tuesday, September 20

### Intercomparison Activities (Chair: M. Schmidt)

8:30-8:50	<b>N. Gavrilov</b>	Intercomparison of optical and in situ CO <sub>2</sub> measurements
8:50-9:10	<b>H. Mukai</b>	About disagreement between inter-comparisons of isotopic ratio measurements for CO <sub>2</sub>
9:10-9:30	<b>I. Levin</b>	Results from the International Sausage Flask Intercomparison
9:30-9:50	<b>A. Manning</b>	GOLLUM: A Worldwide O <sub>2</sub> /N <sub>2</sub> Intercomparison Program - First Results
9:50-10:10	<b>D. Worthy</b>	Alert GAW Station: ICP - Program Update and Possible Super Site?
10:10-10:40	<b>--Break and Group Photo--</b>	
<b>10:40-11:30</b>	<b>Discussion (A. Manning) Recommendations concerning Intercomparison Activities</b>	
11:30-12:50	<b>--Lunch--</b>	

### Isotope Calibration and Measurement (Chair: D. Lowe)

12:50-1:10	<b>L. Huang</b>	A diagnostic tool for traceability difference/standard shifting in isotope measurements of atmospheric CO <sub>2</sub> & ICP at Alert
1:10-1:30	<b>W. Brand</b>	Relating air-CO <sub>2</sub> isotope ratio determinations to VPDB using Calcite-CO <sub>2</sub> mixed into CO <sub>2</sub> -free air
1:30-1:50	<b>J. White</b>	INSTAAR/NOAA program on isotopes in greenhouse gases
1:50-2:10	<b>D. Lowry</b>	Continuous automated carbon isotopic measurements of atmospheric methane or carbon dioxide using a modified GV Instruments Trace Gas pre-concentrator
2:10-2:30	<b>--Break--</b>	
2:30-2:50	<b>C.S. Wong</b>	Time-series air-sea disequilibrium of <sup>13</sup> C and CO <sub>2</sub> in subarctic Pacific and at arctic WMO station at Alert
2:50-3:10	<b>I. Levin</b>	Overview of recent <sup>14</sup> C measurements
3:10-3:30	<b>S. Lehman</b>	CMDL/INSTAAR <sup>14</sup> C measurement activities
<b>3:30-5:00</b>	<b>Discussion (W. Brand and J. Miller) Recommendations concerning Isotope Calibration and Measurements</b>	

## Wednesday, September 21

### CO<sub>2</sub> Measurements

#### 1. Low-Cost, Robust CO<sub>2</sub> Measurement Systems (Chair: T. Machida)

8:30-8:50	<b>K. Davis</b>	Progress with continuous, flux-tower based CO <sub>2</sub> sensors: Instrumentation and analyses
8:50-9:10	<b>M. Laakso</b>	A rugged NDIR CO <sub>2</sub> measurement probe for environmental studies
9:10-9:30	<b>M. Hahn</b>	The AOS Carbon Dioxide Archive: Vertical Profiles above Ameriflux (40.734N, 104.301W) in Northeastern Colorado
9:30-9:50	<b>B. Stephens</b>	An Autonomous, Inexpensive, and Robust CO <sub>2</sub> Analyzer (AIRCOA)
9:50-10:10	<b>--Break--</b>	

#### 2. New CO<sub>2</sub> Measurement techniques (Chair: T. Machida)

10:10-10:30	<b>T. Machida</b>	New CO <sub>2</sub> Measurement Systems Using Aircraft
10:30-10:50	<b>J. Welles</b>	Assessing LI-COR's Factory CO <sub>2</sub> Calibration
<b>10:50-11:50</b>	<b>Discussion and Recommendations concerning in situ CO<sub>2</sub> Measurements (B. Stephens)</b>	
11:50-1:10	<b>--Lunch--</b>	

### Data Management and Quality Assurance (Chair E. Brunke)

1:10-1:30	<b>Y. Tsutsumi</b>	Current Status and Advances of World Data Centre for Greenhouse Gases (WDCGG) Operation
1:30-1:50	<b>E. Scheel</b>	Quality Assurance and Quality Control for N <sub>2</sub> O
1:50-2:10	<b>J. Klausen</b>	Quality Assurance and Quality Control of CO and CH <sub>4</sub> Measurements in GAW
2:10-2:30	<b>--Break--</b>	
<b>2:30-3:00</b>	<b>Discussion (E. Scheel)</b>	
<b>3:00-3:30</b>	<b>Recommendations concerning Data Management and Quality Assurance</b>	
<b>3:30-5:00</b>	<b>Recommendations concerning CH<sub>4</sub> (E. Dlugokencky); CO (P. Novelli); and N<sub>2</sub>O (B. Hall)</b>	
	<b>Discussion of any topics</b>	
	<b>Draft of Recommendations (I. Levin)</b>	

## Thursday, September 22

### Regional Networks (L. Haszpra)

8:30-8:50	<b>P. Ciais</b>	Atmospheric CO <sub>2</sub> and greenhouse gases observations in the CarboEurope program
8:50-9:10	<b>A. Vermeulen</b>	The CHIOTTO tall tower program in Europe: first results
9:10-9:30	<b>M. Schmidt</b>	RAMCES: The French network of atmospheric greenhouse gas measurements
9:30-9:50	<b>F. Kashin</b>	Measurements of Greenhouse Gases Contents in the Air near the Ground, in the Atmospheric Boundary Layer and in the Atmospheric Column to Study Their Variability
9:50-10:10	<b>M. Leuenberger</b>	First online CO <sub>2</sub> and O <sub>2</sub> measurements at the Swiss high alpine research station Jungfraujoch
10:10-10:30	<b>--Break--</b>	
10:30-10:50	<b>A. Andrews</b>	The NOAA CMDL Tall Tower Trace Gas Observing Network
10:50-11:10	<b>C. Sweeney</b>	CMDL Aircraft Network Technical Progress Report
11:10-12:00	<b>Discussion Concerning Regional Networks (A. Andrews)</b>	
12:00-1:20	<b>--Lunch--</b>	
1:20-2:30	<b>Recommendations concerning Measurement Strategies Discussion of any topics</b>	
2:30-3:00	<b>--Break--</b>	
3:00-5:00(5:30) 5:00(5:30)	<b>Discussion and Approval of Draft Recommendations (I. Levin)</b> Meeting is adjourned	
6:30	<b>Cocktails-University Club at Folsom Field</b>	
7:00	<b>Banquet-University Club at Folsom Field</b>	

**Monday, September 19**

**Posters**

<b>D. Baer</b>	Novel instrumentation for fast, accurate measurements of CO <sub>2</sub> , CH <sub>4</sub> , and CO in the field
<b>R. Fisher</b>	Applications of the GV Instruments Trace Gas for methane and carbon dioxide isotopes studies: London diurnals and Irish wetland emissions
<b>P. Galdemard</b>	CARIBOU : New instruments for continuous CO <sub>2</sub> measurements and real-time data transmission
<b>L. Gatti</b>	Carbon Dioxide and other trace species high precision measurements over Amazon Basin
<b>R. Jiminez</b>	A new quantum-cascade laser based spectrometer for high-precision airborne CO <sub>2</sub> measurements
<b>D. Kitzis</b>	Changes to CMDL/CCGG Standards Filling Program
<b>I. Levin</b>	The Heidelberg Observational Program of Greenhouse Gases and their Isotopic Properties at the German GAW Station Neumayer (Antarctica)
<b>K. Masarie</b>	The GLOBALVIEW-CO <sub>2</sub> Data Product
<b>K. Masarie</b>	Estimating Uncertainties in Atmospheric Measurements
<b>E. Nisbet</b>	Meth-MonitEUr-Methane monitoring in the European Union and Russia
<b>S. Richardson</b>	Progress Towards a Continental, Flux-Tower Based CO <sub>2</sub> Network
<b>M. van der Schoot</b>	Performance of LOFLO continuous CO <sub>2</sub> analysers operating in regional monitoring networks
<b>B. Stephens</b>	A Regional Atmospheric Continuous CO <sub>2</sub> Network in the Rocky Mountains (Rocky RACCOON)
<b>B. Stephens</b>	An Autonomous, Inexpensive, and Robust CO <sub>2</sub> Analyzer (AIRCOA)

## **Posters**

### **National Programs**

<b>S. Attri</b>	Indian initiatives for GHG monitoring
<b>G. Brailsford</b>	CO <sub>2</sub> Measurements at Baring Head, New Zealand
<b>E. Brunke</b>	CO <sub>2</sub> and CH <sub>4</sub> measurements at Cape Point, South Africa
<b>A. Gomez-Pelaez</b>	Methane and Carbon Dioxide Continuous Measurements at Izana Station (Spain)
<b>L. Haszpra</b>	Tall tower carbon budget monitoring and research programs in Hungary (national report)
<b>R. Neubert</b>	The Atmospheric CO <sub>2</sub> and Greenhouse Gas Monitoring Activities at Lutjewad and Cabauw
<b>R. Santaguida</b>	The Italian Carbon Dioxide Measurement Network
<b>L. Zhou</b>	China Country Report: Greenhouse gases and related tracers Measurements at Waliguan Observatory